THE MINERAL INDUSTRIES OF AFRICA

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The 55 independent nations and other territories of continental Africa and adjacent islands covered in this volume encompass a land area of 30.6 million square kilometers, which is more than three times the size of the United States, and were home to 868 million people in 2004. For many of these countries, mineral exploration and production constitute significant parts of their economies and remain keys to future economic growth. Africa is richly endowed with mineral reserves and ranks first or second in quantity of world reserves of bauxite, cobalt, diamond, phosphate rock, platinum-group metals (PGM), vermiculite, and zirconium.

The mineral industry was an important source of export earnings for many African nations in 2004. To promote exports, groups of African countries formed numerous trade blocs, which included the Common Market for Eastern and Southern Africa, the Economic and Monetary Community of Central Africa, the Economic Community of Central African States, the Economic Community of the Great Lakes Countries, the Economic Community of West African States, the Mano River Union, the Southern African Development Community, and the West African Economic and Monetary Union. Algeria, Libya, and Nigeria were members of the Organization of the Petroleum Exporting Countries (OPEC). The African Union was formally launched as a successor to the Organization of African Unity in 2002 to accelerate socioeconomic integration and promote peace, security, and stability on the continent.

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For mineral production statistics—
- Algeria—Ministry of Energy and Mines,
- Botswana—Department of Mines,
- Burundi—Ministry of Energy and Mines,
- Côte d'Ivoire—National Corporation of Petroleum Operations,
- Egypt—Ministry of Petroleum,
- Eritrea—Department of Mines,
- Ethiopia—Ministry of Mines and Energy,
- Gambia, The—Geology Department,
- Ghana—Minerals Commission,
- Guinea—Ministry of Mines and Geology,
- Kenya—Ministry of Environment, Natural Resources, and Wildlife,
- Lesotho—Department of Mines and Geology,
- Malawi—Department of Mines,
- Mauritius—Ministry of Agriculture, Food Technology, and Natural Resources,
- Morocco—Ministry of Energy and Mines,
- Mozambique—National Directorate of Mines,
- Namibia—Ministry of Mines and Energy,
- Senegal—Ministry of Mines, Energy, and Water,
- Seychelles—Ministry of Economic Planning,
- Sierra Leone—Director of Mines,
- South Africa—Department of Minerals and Energy, Mineral Economics Directorate,
- Tanzania—Ministry of Energy and Minerals, and
- Zimbabwe—Chamber of Mines.

For basic economic data—the International Monetary Fund in the United States.

For mineral consumption data—
- British Petroleum plc,
- Department of Minerals and Energy of the Republic of South Africa,
- MEPS (International) Ltd., and
- U.S. Department of Energy in the United States.

For exploration and other mineral-related information—the Metals Economics Group (MEG) in Canada.

General Economic Conditions

In 2004, the real gross domestic product (GDP) of Africa grew by 5.3% after increasing by 4.6% in 2003. From 1999 to 2004, Africa's GDP grew at an average annual rate of about 4.2%. In 2004, Equatorial Guinea and Chad achieved the most rapid economic growth in Africa with GDP increases of 14.7% and 10.7%, respectively. Higher production of crude petroleum and natural gas was a major factor in the performance of the economies of Angola, Chad, and Equatorial Guinea. In 2004, the GDP increased by an average of 7.5% in African petroleum-exporting countries and by an average of 4.6% in African petroleum-importing countries. GDP growth in African petroleum-exporting countries was projected to be at or about 5.1% in 2005 and 7.8% in 2006. In petroleum-importing countries, GDP growth was expected to increase to 4.3% in 2005 and 5.2% in 2006 (International Monetary Fund, 2005b, p. 49, 212).

Investment Data and Political Risk

The Department of Minerals and Energy of the Republic of South Africa reported that investment in newly committed mineral-related projects (that is, projects in which funds have already been committed or are being expended) in South Africa was $9.37 billion in 2004. PGM accounted for 57% of the newly committed investment; gold, 24%; other primary minerals, 12%; and processed minerals, 7%. An additional $8.33 billion was reported for potential mineral-related projects (that is, feasibility-level projects for which funds have not yet been committed) in South Africa. Gold accounted for 55% of the potential mineral projects; PGM, 37%, and other primary minerals, 8% (Mwape and others, 2005, p. 21).

By 2008, capital expenditures on heavy mineral sands projects were expected to be $840 million at Corridor Sands and Moma in Mozambique, $120 million at Kwale in Kenya, and $70 million at Imperri Hills in Sierra Leone. By 2009, capital expenditures for bauxite and alumina in Guinea were likely to be more than $2.35 billion; nickel in Madagascar, $2.25 billion; and coal in Mozambique, $1 billion. Substantial capital expenditures were also likely for aluminum in Mozambique and South Africa, copper in Congo (Kinshasa) and Zambia, crude petroleum in Nigeria and Sudan, iron ore in Mauritania and Senegal, and natural gas in Nigeria.

Countries directly affected by wars, internal ethnic or political conflicts, and refugee displacements in 2004 included Angola, Burundi, Chad, Congo (Kinshasa), Cote d'Ivoire, Nigeria, Somalia, Sudan, and Uganda. In December 2004, the Government of Sudan signed a permanent cease-fire with the Sudanese People's Liberation Army. Political instability in Burundi led to a reimposition of force majeure at the Musongati nickel deposit in August. The control of gold and tin mines reportedly played an important role in conflicts in eastern Congo (Kinshasa) (Global Witness, 2005, p. 8, 16; Human Rights Watch, 2005, p. 94-96).

Legislation

All mineral exploration in Eritrea was suspended between September 2004 and January 2005. Although no formal justification was announced, the suspension period was most likely imposed to enable review of all aspects of mining law in Eritrea (Mining Journal, 2005). A new mining code was implemented in Senegal in 2004 to define fiscal and legal responsibilities and to provide tax incentives for mining concessions (Mining Journal, 2004a).

During 2002 and 2003, the Government of South Africa put forward new mineral rights legislation and an empowerment charter. The Mineral and Petroleum Resources Development Act, which came into effect in May 2004 (with a 1-year transition period that will end in May 2005), is the principal legislative instrument for implementing the social and economic reforms envisaged by the charter. The Act changes the regulation of access to and ownership of mineral resources in South Africa. It establishes a means of converting existing mining and prospecting rights (old order) and establishing new rights (new order) and sets up a scorecard approach to achieving the mining charter objectives (Mining Journal, 2004b; Rio Tinto plc, 2004§[1]). Accompanying legislation related to royalty and beneficiation issues was due out in early 2005.

Exploration

Exploration activity, as defined by African exploration budgets reported by Metals Economics Group (MEG), increased to $572 million in 2004 from $374 million in 2003 (Metals Economics Group, 2004b). The Africa exploration budget share, however, decreased to 16.1% of the world exploration budget in 2004 from 17.1% in 2003. In 2004, the principal mineral targets in Africa were diamond, gold, and PGM (Metals Economics Group, 2004a). Diamond exploration was conducted mainly in Botswana, Namibia, and South Africa. Gold exploration was conducted mainly in the Birimian Shield of Burkina Faso, Ghana, and Mali; the Kaapvaal Craton of South Africa and Zimbabwe; and the Tanzanian Craton. PGM exploration continued in South Africa, particularly on the Platreef section of the Bushveld Complex. Gold and base metals continued to be explored for in central Africa, primarily in Congo (Kinshasa) and Zambia. Interest in minerals exploration in Madagascar was also renewed.

A recent study released by the Department of Minerals and Energy of the Republic of South Africa reported that although mineral exploration expenditures had increased since 2002, South Africa had lost some of its ability to attract new exploration dollars owing to increased interest in minerals exploration in Australia and Canada (Mwape and others, 2004, p. 8). Part of this loss is a reflection of the relative strength of the South African rand, which raises the cost of conducting business in South Africa. This has resulted in South African mining companies seeking opportunities outside of South Africa. At the same time, changing South African mineral rights legislation made it easier for new participants to enter the exploration business.

African countries that experienced the highest levels of exploration activity in 2004 were, in descending order based on the number of exploration sites included in this annual review, South Africa, Ghana, Mali, Tanzania, Burkina Faso, Congo (Kinshasa), Zambia, Namibia, and Botswana. Gold accounted for approximately 54% of reported African exploration projects; diamond, 14%; PGM, 11%; and base metals, 10%. Early-stage projects accounted for about 79% of the 2004 activity, and feasibility-stage projects, about 11%.

Two World Bank mining sector projects in Africa were financed in 2004. The $120 million Private Sector Development and Competitiveness Project in Congo (Kinshasa) and the $25 million Sustainable Management of Mineral Resources Project in Uganda have the potential to affect mineral exploration in these countries positively (World Bank Group, 2004§).

[1]References that include a section mark (§) are found in the Internet References Cited section.

Commodity Overview

Estimates for production of major mineral commodities for 2007 and beyond have been based upon supply-side assumptions, such as announced plans for increased production/new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2004) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future production, exploration and mine development, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

Metals

Africa's share of world base-metals production and consumption was modest. Mine production of bauxite, copper, gold, and lead was less than that of 1990. Africa produced more than one-fourth of the world's manganese mine output and nearly one-fifth of the world's refined cobalt. South Africa was the world's leading producer of chromite and ferrochromium, gold, manganese ore, palladium, platinum, and vanadium and the world's second ranked producer of manganese and ferromanganese, rutile, and zircon.

The low level of consumption was the result of Africa's low level of industrialization. In 2004, Africa was a net exporter of aluminum, copper, iron ore, nickel, and zinc; it was also a net exporter of iron ore. Africa's share of world steel consumption was about 2%. Within Africa, South Africa was the leading consumer of base metals and steel.

Aluminum and Bauxite and Alumina.—*Production.*—African production of refined aluminum rose by 19% compared with that of 2003. In Mozambique, 2004 was the first year of full production for the Mozal 2 smelter, which was completed in 2003. South Africa's production increased because of the expansion of the Hillside smelter. Output also increased in Cameroon and Egypt. South Africa accounted for about 50% of African aluminum output; Mozambique, 32%; and Egypt, 13% (table 6). Kenya was the only African producer of secondary refined aluminum. Africa accounted for nearly 5% of the world's aluminum production in 2004 (table 4).

African bauxite production remained nearly unchanged in 2004 at 15.5 million metric tons (Mt). From 1990 to 2004, Africa's share of world bauxite production fell to less than 11% from 16%. Guinea accounted for about 97% of African bauxite production; Ghana accounted for most of the remainder (table 5). In 2004, Guinea was the only African producer of alumina; its output was 770,000 metric tons (t), or 1% of world alumina production.

Consumption.—In 2004, world aluminum consumption amounted to 29.5 Mt compared with 27.3 Mt in 2003. African consumption of aluminum fell by nearly 3% to 345,000 t in 2004. South Africa accounted for most of Africa's aluminum consumption (Themba, 2005a).

Outlook.—The production of refined aluminum is expected to rise by an average of nearly 7% per year from 2004 to 2011. The Coega smelter in South Africa and the Mozal 3 smelter in Mozambique are expected to open in 2008 and 2009, respectively. If privatization goes forward, Aluminum Smelter Co. of Nigeria Ltd. could reopen its smelter at Ikot Abasi by 2009 and reach full capacity by 2011 (table 6; Alcan Inc., 2004; Hill, 2006).

African bauxite production could increase to 27.5 Mt by 2009 (table 5). In Guinea, planned increases in alumina refining capacity of about 5 million metric tons per year are expected to lead to higher bauxite production. The Kamsar and the Sangarédi refineries are likely to be completed in 2008, and the expansion of the Friguia refinery could be completed in 2009.

Copper.—*Production.*—In 2004, Africa's mine production increased by 11% from 2003 and 40% from 2000. Zambia was the leading producer in Africa; the country's copper mine production rose by nearly 23% in 2004. The production increase in Congo (Kinshasa) was mostly attributable to rising output from Bwana Mkubwa. Output fell in South Africa because of the closure of the Maranda Mine. In 2004, Zambia accounted for 65% of African copper mine production; South Africa, 16%; and Congo (Kinshasa), 11% (table 7). Africa's share of world copper mine output fell to less than 5% in 2004 from 14% in 1990.

Africa's refined copper production rose by nearly 6% from 2003 to 2004; increasing production from Zambia more than offset lower South African production. In South Africa, production declined because of lower output from the Palabora refinery. In 2004, Zambia accounted for 78% of African refined copper production; South Africa, 18%; and Egypt, 3%. Congo (Kinshasa), which accounted for 37% of continental refined copper output in 1990, had ceased production by 2000 (table 8). Egypt was the only producer of secondary refined copper; primary production accounted for most African production.

Consumption.—In 2004, world refined copper consumption increased to 16.4 Mt from 15.4 Mt in 2003; African consumption of copper amounted to about 160,000 t in 2004. South Africa accounted for more than 80% of Africa's refined copper consumption (Themba, 2005b).

Outlook.—Copper mine production could nearly double by 2009. Output is likely to rise sharply in Zambia; the Chibulma South and the Kansanshi Mines are expected to open in 2005, and the Lumwana Copper Project, in 2006. Expansions are planned for the Mufulira and the Nkana Mines. Production in Congo (Kinshasa) could more than triple by 2009 because of the development of the Mutoshi Mine in 2006, the Kolwezi tailings project and the Tenke Mine in 2008, and the Ruashi Mine in 2009. Congolese production is likely to decline by 2011 because of the shutdown of Bwana Mkubwa and the Dikilushi Mine. In Mauritania, the Guelb Moghrein Mine is expected to start production in late 2005. Mining from a copper-rich zone at Bisha was likely to start in Eritrea in 2010 (table 7; Adastra Minerals Inc., 2005; Tenke Mining Corp., 2005; Yu and others, 2005, p. 1.4, 18.3, 18.22, 18.41).

The production of refined copper is expected to rise by an average of nearly 13% per year from 2004 to 2009. Most of the increase would be attributable to the reopening of the Konkola refinery in Zambia in 2007. In South Africa, production is expected to increase at the Palabora refinery (table 8).

Gold.—*Production.*—Africa's gold mine production was 555,000 kilograms in 2004, which was a decrease of 7% compared with that of 2003. Production was considerably less than that of 1990 because of the long-term decline in South African production (table 9). From 1990 to 2004, Africa's share of world gold mine production fell to about 23% from 32% (table 4).

In South Africa, the decrease in production was broad based in 2004, with output falling at the Beatrix, the Blyvooruitzicht, the Kloof, the Mponeng, the North West, the Savuka, the Tau Lekoa, and the Tau Tona Mines. The decline in Ghana's production was partially attributable to lower output at the Bogoso Mine. Mali's output fell because of lower production at the Morila Mine. Production fell in Guinea because of a gold bullion export embargo by the Government. Tanzania's production increased because of higher production from the Bulyanhulu and the Geita Mines. The Mupane and the Samira Hill Mines opened in Botswana and Niger, respectively. Output also increased in Zimbabwe.

In 2004, South Africa accounted for 61% of African gold production; Ghana, 11%; Tanzania, 9%; and Mali, 7%. South Africa's share of continental gold production had fallen from 81% in 1995 and 89% in 1990 because of rising production costs associated with deeper underground operations and increased production in Ghana, Guinea, Mali, and Tanzania (table 9).

Outlook.—Gold mine production is expected to rise slightly from 2004 to 2009 and then to decline by about 4% from 2009 to 2011. The decreases in output in Mali, South Africa, and Tanzania could more than offset increased production in other countries between 2004 and 2011. The long-term decline in South Africa's production is likely to be reversed temporarily in 2009 because of the completion of the Moab Khotsong Mine in 2006, the Tshepong Decline project and the expansion of the Thistle Mine in 2008, the completion of the Phakisa Shaft in 2009, and the Masimong Mine expansion in 2010. By 2011, these projects could be more than offset by the shutdown of the Ergo and the North West Mines in 2005, the Savuka Mine in 2007, and the Thistle Mine in 2010, and lower production from the Driefontein and the Kloof Mines (table 9).

In Mali, production is expected to rise sharply by 2007 because of the opening of the Loulo Mine in 2005, the Tabakoto Mine in 2006, and the Syama Mine in 2007. By 2009, however, the shutdown of the Morila and the Yatela Mines could lead to a substantial decrease in production. Tanzania's production is likely to rise to 58 t by 2007 with the opening of the Tulawaka Mine in 2005 and the Buckreef Mine in 2006 and the increased capacity at the North Mara Mine; these increases could more than offset the decreased production at the Bulyanhulu and the Geita Mines. Production in Tanzania is expected to fall to 50 t in 2011 because of the planned closures of the Golden Pride and the Tulawaka Mines (table 9).

In Ghana, the outlook is for a modest increase in output because of higher production from the Wassa Mine. In Guinea, production is likely to increase because of the repeal of the bullion export embargo in late 2004. Botswana's output could increase sharply because of higher production from the Mupane Mine (table 9).

Several African countries that had only artisanal gold production in 2004 are likely to open large-scale gold mines in the near future. In Mauritania, the Guelb Moghrein copper mine is expected to start production in 2005, and the Tasiast gold mine, in 2007. The Taparko Mine is expected to open in Burkina Faso in 2006. Gold-rich zones in the Bisha Mine in Eritrea were planned to be mined from 2008 to 2010. In Congo (Kinshasa), the Kilo Moto Mine could open in 2009. By 2008, World Bank-sponsored projects in Madagascar and Uganda could lead to significant increases in reported artisanal gold production (table 9; Moto Goldmines Ltd., 2005; Yu and others, 2005, p. 1.4, 18.3, 18.22, 18.41).

Iron Ore.—*Production.*—In 2004, the iron content of ore produced in Africa amounted to 35 Mt. South Africa's production rose because of higher output at the Beeshok and the Sishen Mines. In Mauritania, output from Société Nationale Industrielle et Miniere increased. South Africa was the leading iron ore producer in Africa and accounted for 71% of continental output; Mauritania, 21%; and Egypt, 6%. In 1990, South Africa, Mauritania, and Egypt accounted for 60%, 21%, and 4%, respectively, of output (table 10).

Outlook.—The iron content of ore produced in Africa is expected to rise to 61.2 Mt in 2011 (table 10). In South Africa, the expansion of the Sishen Mine is likely to be completed in 2009. Production at the Bruce, the King, and the Mokaning Mines could start in 2009, and at the Sishen South Mine, in 2010. In Mauritania, the Guelb el Aouj iron ore project is expected to start production in 2009. The Faleme iron ore project in Senegal could start production in 2011.

Iron and Steel.—*Production.*—Africa's production of direct-reduced iron (DRI) and pig iron amounted to about 15 Mt in 2004. In South Africa, lower pig iron production more than offset higher output of DRI. Tunisia's production of pig iron ceased because of the shutdown of El Fouladh-Société Tunisienne des Siderurgie's blast furnace. Production increased in Libya and Zimbabwe from 2003 to 2004. From 1990 to 2004, South Africa's share of total African iron production fell to 51% from 66%. During the same period, Egypt's share rose to 29% from 15%. Algeria and Libya accounted for most of the remainder in 2004 (table 11).

From 1990 to 2004, the share of DRI in total African iron production rose to 39% from 20%. During the same period, the share of DRI in total iron production in Egypt increased to 60% from 39%; and in South Africa, to 21% from 13% (table 11).

In 2004, African production of crude steel remained nearly unchanged. South Africa accounted for 58% of regional crude steel production; Egypt, 27%; and Algeria and Libya, 6% each (table 12). Africa's share of world crude steel production amounted to nearly 2% in 2004 (table 4).

South Africa produced about 7.1 Mt of hot-rolled steel products in 2004; Libya, 867,000 t; and Tunisia, 130,000 t. Other African producers of hot-rolled steel products included Algeria, Egypt, and Morocco (International Iron and Steel Institute Committee on Economic Studies, 2005, p. 48).

Consumption.—Africa accounted for 2% of global finished steel consumption. Africa consumed 17.5 Mt of finished steel products in 2004 compared with 17.1 Mt in 2003 and 15.4 Mt in 1999 [MEPS (International), undated§].

Outlook.—The production of DRI and pig iron is expected to rise by an average of nearly 3% per year from 2004 to 2011. Nigeria could account for a majority of the increase in production because of the opening of the Ajaokuta steel plant in 2007. In South Africa,

the increase would be attributable to the expansion of DRI capacity at the Vanderbijlpark steel plant in 2006 and pig iron capacity from 2006 to 2009. In Mozambique, pig iron production is expected to start in 2008 with the completion of the Corridor Sands project (table 11).

Crude steel production is expected to rise by an average of about 4% per year from 2004 to 2011. Nigeria, which accounted for less than 1% of African crude steel output in 2004, could increase its share to 9% by 2011 with the opening of the Ajaokuta steel plant in 2007. In South Africa, the expansion of the Vanderbijlpark steel plant was planned to take place from 2006 to 2009. In Algeria, restoration of capacity is expected to raise national steel production to 1.7 Mt by 2007. Libyan output is expected to approach full capacity by 2005. Production could rise in Zimbabwe as Zimbabwe Iron and Steel Company restores its capacity (table 12). African consumption of finished steel is expected to rise to 19 Mt by 2008 [MEPS (International), undated§].

Lead.—*Production.*—In 2004, African lead mine production fell by 13% compared with that of 2003 and 49% compared with that of 2000. In Namibia, output fell at the Rosh Pinah Mine. South Africa's production continued its decline because of lower production at the Black Mountain Mine. Production fell in Morocco and rose in Tunisia. In 2004, South Africa accounted for 42% of African lead mine production; Morocco 35%; and Namibia, 16% (table 13). Africa's share of the world's lead mine production was about 3% (table 4).

In 2004, African production of primary refined lead fell by 41% compared with that of 2003; the decrease may have been attributable to lower lead mine production in Morocco. Morocco, which was the leading African producer of primary refined lead, accounted for 88% of continental output. Production also fell in Algeria. South Africa accounted for 87% of African secondary refined lead output; Kenya, Morocco, and Nigeria accounted for the remainder of African secondary lead production. In 2004, African production of secondary refined remained nearly unchanged; higher production in Morocco offset lower output in South Africa. The share of primary lead in total refined lead production in Africa fell to 35% in 2004 from 64% in 1995 and 72% in 1990 (tables 14, 15).

Consumption.—In 2004, world refined lead consumption was about 7.08 Mt compared with 6.8 Mt in 2003. South African lead consumption increased to 80,700 t in 2004 from 78,700 t in 2003 (Maphango, 2005a).

Outlook.—The decline in African lead production is likely to be reversed, with output rising by 17% from 2004 to 2007. African production is expected to remain substantially lower than that of 2000. In South Africa, the expansion of the Black Mountain Mine in 2007 could increase production substantially. Tunisia's output is expected to fall with the closure of the Bougrine Mine; Namibia's production is also likely to decline (table 13). Primary and secondary refined lead production is expected to remain unchanged (table 14, 15).

Nickel.—*Production.*—African mine production of nickel fell by nearly 4% in 2004 compared with that of 2003; nickel was produced almost exclusively in southern African countries. Production decreased in Botswana and South Africa and increased in Zimbabwe. The majority of South Africa's nickel output was a coproduct of PGM mining. In 2004, South Africa accounted for 47% of African nickel mine output; Botswana, 42%; and Zimbabwe, 11% (table 16). Minor tonnages of nickel were recovered as a byproduct of cobalt operations in Morocco.

Consumption.—In 2004, South Africa's consumption of nickel increased to 25,000 t from 24,000 t in 2003. The stainless steel industry accounted for most of South Africa's nickel demand (Harding, 2005).

Outlook.—Nickel mine production is likely to increase by 80% from 2004 to 2009 and then decline by 5% from 2009 to 2011. The startup of the Ambatovy nickel and cobalt mine in 2008 in Madagascar is expected to account for the majority of the increase. Madagascar, which did not mine nickel in 2004, could have a 40% share of African nickel mine production in 2011. South Africa's output is expected to rise by about one-third by 2009, most of which would be attributable to increased capacity at the Nkomati Mine. In Zimbabwe, the Shangani Mine is expected to close by 2008, and the Hunter Road Mine, to open by 2011. Botswana's production is likely to fall because of the shutdown of the Selebi-Phikwe Mine in 2011 (table 16).

Platinum-Group Metals.—*Production.*—In 2004, Africa's production of palladium and platinum increased by 10% and 8%, respectively, compared with that of 2003. South African production rose because of higher output from the Kroondal, the Impala, the Modikwa, and the Rustenburg Mines. Production increased in Zimbabwe because of higher output from the Mimosa and the Ngezi Mines. South Africa, which was the continent's dominant producer of PGM in Africa, accounted for 97% and 96% of the production of platinum and palladium, respectively (tables 17, 18).

Outlook.—African mine production of palladium is expected to increase by an average of 3% per year from 2004 to 2011, and platinum, by between 2% and 3% per year (tables 17, 18). In South Africa, the increase is likely to be attributable to higher production from the Kroondal and the Modikwa Mines and the opening of the Two Rivers and the Everest Mines in 2005, higher production from Rustenburg by 2006, and the start of production from Nkomati in 2009. Higher output in Zimbabwe is likely to result from the expansion of the Ngezi Mine by 2006 and the opening of the Unki Mine by 2007.

Zinc.—*Production.*—Africa's mine production of zinc fell by about 4% in 2004 compared with that of 2003. South African production fell because the closure of the Maranda Mine more than offset higher output from the Black Mountain Mine. The decrease in Tunisia's production was attributable to lower output from the Bougrine Mine. In Algeria, output declined because of the shutdown of El Abed and the Kherzet Youcef Mines. Namibia's production increased because of the opening of the Skorpion Mine; production also increased in Morocco. In 2004, Morocco accounted for 37% of African zinc mine production; Namibia, 33%; South Africa, 16%; and Tunisia, 14% (table 19). Africa's share of world zinc mine production was about 2% (table 4).

In 2004, African production of zinc metal rose by 30% compared with that of 2003. In Namibia, production rose sharply at the Skorpion smelter. South Africa's production fell because of a shortage of zinc concentrates; output also declined in Algeria. Namibia, which did not produce zinc metal prior to 2002, accounted for 48% of continental zinc metal production in 2004. South Africa's share fell to 42% in 2004 from 75% in 2000, and Algeria's share, to 10% from 25% (table 20).

Consumption.—In 2004, world refined zinc consumption was about 10.5 Mt compared with nearly 9.9 Mt in 2003. South African zinc consumption increased to 90,900 t in 2004 from 86,000 t in 2003 (Maphango, 2005b).

Outlook.— African zinc mine production is likely to rise by 17% from 2004 to 2007. The majority of the increase could be attributable to higher production from the Hajar Mine in Morocco. In South Africa, the expansion of the Black Mountain Mine is expected to increase production substantially. Output is also likely to increase in Algeria. The depletion of the Bougrine Mine in 2005 could cause Tunisia's share of African zinc mine production to fall to less than 1% by 2007 (table 19). In Congo (Kinshasa), the proposed reopening of the Kipushi Mine and the reprocessing of zinc and germanium tailings near Kolwezi could lead to further increases in production, but whether these projects will be implemented by the end of 2011 is uncertain.

Higher production from the Skorpion smelter in Namibia could increase regional production of zinc metal by 12% by 2007. Namibia could account for 54% of Africa's zinc metal output in 2007 (table 20).

Industrial Minerals

Africa was a significant producer of several industrial minerals. In 2004, Botswana was the world's leading producer of diamond by value. Tanzania was the only producer of tanzanite in the world. Kenya, Madagascar, and Zambia were leading producers of ruby, sapphire, and emerald, respectively. South Africa accounted for nearly 40% of reported global vermiculite production.

Africa's consumption of sulfuric acid was mostly for agricultural purposes; this use reflected the continent's low level of industrialization. In recent years, cement consumption increased substantially in such countries as Ethiopia, Kenya, Mozambique, Tanzania, and Uganda.

Diamond.—*Production.*—In 2004, Africa's share of world diamond production by volume was 48%. African diamond production increased by more than 9% in 2004 compared with that of 2003. The increase in output was broadly based, with production rising in Angola, Botswana, Central African Republic, Congo (Kinshasa), Guinea, Namibia, Sierra Leone, South Africa, and Tanzania (tables 4, 21).

Congo (Kinshasa) accounted for the majority of the increase in production by volume. Increased political stability and the Kimberley Process led to higher production by artisanal miners. Sociètè Minièrè de Bakwanga (MIBA) also increased its output. The main cause of higher South African production was increased production at the Kimberley and the Venetia Mines. In Namibia, higher production was attributable to Namdeb Diamond Corporation (Pty) Ltd.'s increased output. Production also increased at the Williamson Mine in Tanzania. The Murowa Diamond Project commenced production in Zimbabwe. Botswana accounted for 35% of African diamond output by volume; Congo (Kinshasa), 35%; South Africa, 16%; and Angola, 7% (table 21).

In 2004, the global value of rough diamond production amounted to $10.6 billion, of which Africa accounted for more than 60%. Botswana accounted for 24% of the value of global rough diamond output; South Africa and Angola, 11% each; Congo (Kinshasa), 10%; and Namibia, 5% (Janse, 2005).

In November 2001, the Kimberley Process certification scheme was established to reduce the trade of conflict diamond, particularly diamond originating from Angola, Congo (Kinshasa), and Sierra Leone. The establishment of the Kimberley Process involved Government officials from more than 50 countries that produced, processed, and imported diamond as well as representatives from the European Union, the World Diamond Council, and nongovernmental organizations. As of October 2004, the following African countries had met the minimum requirements of the Kimberley Process Certification Scheme: Angola, Botswana, Central African Republic, Congo (Kinshasa), Côte d'Ivoire, Guinea, Lesotho, Mauritius, Namibia, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, and Zimbabwe.

Outlook.—The production of rough diamond is expected to rise by an average of nearly 2% per year from 2004 to 2011. In Angola, the majority of the projected increase in output would be attributable to the expansion of the Catoca Mine; Angola's share of African diamond production could rise to 11% in 2011. Production could also rise in Congo (Kinshasa) because of the planned expansion of MIBA's facilities by 2008. European Diamonds plc has plans to start mining in Lesotho in 2005. Zimbabwe's production could increase because of higher production from Murowa. Output is also expected to rise in Botswana, Namibia, and South Africa because of higher production at mines operated by DeBeers Group (table 21).

Phosphate Rock.—*Production.*—In 2004, the phosphorous pentoxide (P_2O_5) content of African phosphate rock production amounted to about 13.9 Mt. Output increased in Morocco and fell in Algeria and Togo in 2004. Morocco, which was the leading producer of phosphate rock in Africa, accounted for 61% of continental phosphate rock output in 2004; Tunisia, 17%; and South Africa, 8% (table 22).

Outlook.—The P_2O_5 content of African phosphate rock production is expected to increase to 14.8 Mt in 2009. In Morocco, planned expansions of the Khourigba Mines could increase Morocco's production to 9 Mt in 2007. In Senegal, production is expected to rise because of higher capacity at the Tobene Mine. Production is also expected to rise in Tunisia (table 22).

Mineral Fuels

Africa was a producer of mineral fuels; its share of world uranium production was nearly 20%. South Africa was a significant producer and exporter of bituminous coal. Most of Africa's natural gas production was in the northern part of the continent. Northern and western African countries were the most significant producers of crude petroleum. Niger was one of the world's leading producers of uranium. Africa's share of world mineral fuel consumption was modest.

Coal.—*Production.*—Regional coal production rose by 1% in 2004 compared with that of 2003. Most of the increase was attributable to South Africa; production increased at a number of mines that included the Goedehoop, the Grootegeluk, the New Denmark, the New Vaal, the Phoenix, the Tavistock, and the Tshikandeni. Output also increased in Botswana and Zambia and fell in

Zimbabwe; the fall in Zimbabwe's production was the result of resource depletion at the M-Block underground mine. South Africa, which was the dominant coal producer in Africa, accounted for 98% of regional coal output; Zimbabwe, 1%; and others, less than 1% (table 23). More than 99% of South Africa's coal production was bituminous. Africa accounted for about 5% of total world anthracite and bituminous coal production.

Consumption.—Africa accounted for nearly 4% of world coal consumption in 2004. Within the region, South Africa accounted for 92% of African coal consumption. From 1999 to 2004, Africa's consumption of coal rose by about 14% (British Petroleum plc, 2005, p. 33).

Outlook.— African coal production is expected to increase by an average of 2% per year from 2004 to 2011. South Africa is likely to be responsible for the majority of the increase; its production could increase to 266 Mt by 2009. Higher output would be attributable to the opening of the Kriel South Mine in 2005 and the expansions of the Syferfontein, the Mafube, and the Grootegeluk Mines in 2005, 2007, and 2008, respectively. Mozambique is expected to become the second-ranked coal producer in Africa with the development of the Moatize Project in 2009. The National Development Corporation of Tanzania planned to start production at Mchuchuma in 2008. Zimbabwe's output could rise because of the opening of the 3 Main Mine. In Botswana, production is expected to rise at the Morupule Colliery because of domestic powerplant expansion. Production is also expected to rise in Malawi and Nigeria (table 23).

Natural Gas.—*Production.*—Regional production of dry natural gas increased by nearly 4% in 2004 from 2003. Nigeria accounted for most of the increase in output. In Libya, higher production was attributable to the startup of the Wafa Field. The North Tano, Songo Songo, and Temane projects started in Ghana, Tanzania, and Mozambique, respectively. Production also increased in Equatorial Guinea and Tunisia. In 2004, Algeria accounted for 59% of Africa's dry natural gas output; Nigeria, 21%; and Egypt, 11%. Nigeria's share of continental dry natural gas output was 5% in 1990 (table 24).

Consumption.—The African continent consumed nearly 3% of the world's natural gas. Africa's consumption rose to 68.6 billion cubic meters in 2004 compared with 66.7 billion cubic meters in 2003 and 50.9 billion cubic meters in 1999. Egypt accounted for 37% of Africa's dry natural gas consumption; Algeria, 31%; and others, 32% (British Petroleum plc, 2005, p. 25).

Outlook.—African production of dry natural gas is expected to rise by nearly 28% from 2004 to 2007 and by an additional 5% from 2007 to 2011. Algeria's output of natural gas is likely to increase because of new production from the In Amenas Field in 2005 and the Gassi Touil Field in 2007. In Libya, production is likely to increase to 8 billion cubic meters in 2011; new sources of gas could include Bahr Essalam. The increase in Nigeria's production is partially attributable to the West African Gas Pipeline, which is expected to be operational in 2006 and the planned elimination of natural gas flaring. Production could also increase at Temane in Mozambique and Songo Songo in Tanzania. Egypt's production is likely to start declining by 2009 (table 24).

Petroleum.—*Production.*—In 2004, African crude petroleum production increased by 10% compared with that of 2003. Nigeria's output rose as the result of an increased production quota authorized by OPEC. In Libya, the increase in production was partially attributable to the startup of the D and the Elephant Fields. Chad's output rose sharply because of the startup of the Bolobo and the Kome Fields. In Sudan, production started in Block 6. The increase in Angola's production was partially attributable to the startup of production in Block 15. Production also increased in Algeria and Equatorial Guinea. Nigeria accounted for 28% of regional crude petroleum production; Algeria, 19%; Libya, 18%; Angola, 11%; and Egypt, 7% (table 25). In 2004, Africa's share of world crude petroleum production amounted to 12% (table 4).

Consumption.—Regional consumption of petroleum products increased to 969 million barrels in 2004 from 939 Mbbl in 2003 and 895 Mbbl in 1999. Africa accounted for about 3% of world petroleum products consumption. Egypt accounted for 21% of African consumption of petroleum products; South Africa, 20%; Algeria, 9%; and others, 50% (British Petroleum plc, 2005, p. 9).

Outlook.—African crude petroleum production is expected to rise by nearly 18% from 2004 to 2007 and to show little change from 2007 to 2011. In Nigeria, annual output is likely to increase to 1.2 billion barrels in 2007. Nigeria's share of African crude petroleum production is expected to rise to 31% in 2011. Sources of additional production in Nigeria would include the Bonga field in 2005 and the Bosi, the Erha, and the Eti/Assa fields in 2006 and 2007. Sudan's output was expected to more than double by 2007 because of higher production from Block 6 and the opening of Blocks 3 and 7 in 2005 and Block 5A in 2006. In Libya, an increase in production is likely to be partially attributable to higher output from Elephant Field onshore Block NC-174 in the Murzuq Basin. The opening of the Baobab field in Côte d'Ivoire was planned for 2005. In Chad, the Doba field was expected to reach full production by 2005. Higher production was also expected from Block 15 in Angola. Output is also likely to increase in Algeria (table 25).

Uranium.—*Production.*—In 2004, African uranium production rose by 19% compared with that of 2003. Most of the increase was attributable to higher production at the Rossing Mine in Namibia; Niger's output also increased. Niger accounted for 46% of African uranium production; Namibia, 43%; and South Africa, 11%. In 1990, Niger's and South Africa's shares of continental production were 30% and 27%, respectively (table 26). Africa accounted for about 19% of the world's uranium production in 2004 (table 4).

Consumption.—South Africa was the only regional consumer of uranium in 2003. Africa accounted for less than 1% of the electricity generated worldwide by nuclear power (British Petroleum plc, 2005, p. 34).

Outlook.—Continental uranium mine production is expected to rise by more than 4% per year from 2004 to 2011 (table 26). In South Africa, the Dominion mine was expected to open in 2007 and to produce more than 1,500 t/yr of uranium in 2010 (Mining Review Africa, 2005). Paladin Resources Ltd. of Australia was considering the development of the Kayelekera Project in Malawi, which could produce about 850 t/yr of uranium starting in 2008 or 2009. Africa's share of world uranium mine production is likely to be about 16% in 2011.

Trade Review and Outlook

Africa's current account surplus amounted to 0.1% of the GDP in 2004; the current account deficit amounted to 0.5% of the GDP in 2003. In 2004, sub-Saharan countries ran an average deficit of 2.1% of the GDP, and countries in the Arab Maghreb Union ran an average surplus of 7.1% of the GDP. Trade surpluses in oil-exporting countries were more than offset by trade deficits in oil-importing countries (International Monetary Fund, 2005b, p. 49).

Oil-importing countries had an average current account deficit of 2.8% of the GDP in 2004, and oil-exporting countries, an average current account surplus of 7.3% of the GDP. The terms of trade worsened for oil-importing countries and improved for oil-exporting countries because of rising oil prices in 2004. The average current account deficit for oil-importing countries is expected to increase to 3.7% of the GDP in 2005 and to 3.5% of the GDP in 2006. For oil-exporting countries, the surplus is predicted to rise to 12.8% of the GDP in 2005 and 17.3% of the GDP in 2006. Africa was expected to run a current account surplus of 1.6% of the GDP in 2005 and 3.5% of the GDP in 2006 (International Monetary Fund, 2005b, p. 49).

In 2004, mineral fuels accounted for more than 90% of the export earnings of Algeria, Equatorial Guinea, Libya, and Nigeria. Minerals and mineral fuels accounted for more than 90% of the export earnings of Sierra Leone (diamond) and more than 80% of the export earnings of Botswana (in order of value, diamond, copper, nickel, and soda ash), Congo (Brazzaville) (petroleum), Congo (Kinshasa) (diamond, petroleum, cobalt, and copper), Gabon (petroleum and manganese), Guinea (bauxite, alumina, gold, and diamond), and Sudan (petroleum and gold). Minerals and mineral fuels accounted for more than 50% of the export earnings of Mali (gold), Mozambique (aluminum and petroleum products), Namibia (diamond, uranium, gold, and zinc), Tanzania (gold, diamond, and colored gemstones), and Zambia (copper and cobalt). Gold was also a significant source of export earnings in Ghana and South Africa. Diamond was a significant source of export earnings in the Central African Republic and South Africa as was iron ore in Mauritania and uranium in Niger (International Monetary Fund, 2005a, p. 86; 2006, p. 67).

Europe's share of Africa's natural gas exports amounted to 93%, and liquefied natural gas (LNG) exports, 88%. Jordan and Tunisia accounted for the remainder of natural gas exports. The United States accounted for 10% of LNG exports, and countries in the Asia and Pacific region, 2% (British Petroleum plc, 2005, p. 28).

In 2004, Europe accounted for 35% of Africa's petroleum exports; the United States, 29%; China, 10%; Japan, 2%; and other countries in the Asia and the Pacific region, 14%. West African countries sent 40% of their exports to the United States and 37% to China, Japan, and other countries in the Asia and the Pacific region. North African countries sent 66% of their exports to Europe and 16% to the United States. Intraregional exports to African countries amounted to only 2% of total African petroleum exports (British Petroleum plc, 2005, p. 18).

Intraregional minerals trade was, however, significant for gold. South Africa imported about 150,000 kilograms per year of gold mostly from West African countries to supply its gold refinery. A majority of African gold mine production was refined in South Africa prior to export to other regions.

Most of Africa's copper production was also exported in refined form. For other commodities, which included bauxite, colored gemstones, diamond, iron ore, petroleum, and uranium, most or all of the continent's production was exported prior to downstream processing.

Environment

Deforestation for fuel use and land-intensive agricultural production continues to be a significant environmental issue in many African countries. Other causes of deforestation included artisanal production of gemstones and lime. The West African Pipeline Project, which was expected to be completed in 2006, could help mitigate the effects of deforestation in Benin, Ghana, and Togo and reduce the emissions of greenhouse gases. Currently (2004), natural gas is being flared by Nigeria; in the future, Nigeria expects to export natural gas to Benin, Ghana, and Togo. The Government of Nigeria has committed to ending the flaring of natural gas, which will also lead to decreased pollution.

The use of mercury by artisanal gold miners has led to serious air and water pollution in such African countries as Ghana, Kenya, Mozambique, South Africa, Sudan, Tanzania, and Zimbabwe. The Global Environment Facility, the United Nations Development Program, and the United Nations Industrial Development Organization began the Global Mercury Project in August 2002 to alleviate these problems. The Global Mercury Project has been providing cleaner technologies and training for miners, conducting health assessments, and helping institute Government regulatory capacities.

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TABLE 1

AFRICA: AREAL EXTENT AND ESTIMATED POPULATION IN 2004[1]

Country	Area[2] (square kilometers)	Estimated population[3] (millions)	
Algeria	2,381,740	32.4	
Angola	1,246,700	14.0	
Benin	112,620	6.9	
Botswana	600,370	1.7	
Burkina Faso	274,200	12.4	
Burundi	27,830	7.3	
Cameroon	475,440	16.4	
Cape Verde	4,033	0.5	
Central African Republic	622,984	4.0	
Chad	1,284,200	8.8	
Comoros	2,170	0.6	
Congo (Brazzaville)	342,000	3.9	
Congo (Kinshasha)	2,345,410	54.8	
Cote d'Ivoire	322,460	17.1	
Djibouti	23,000	0.7	
Egypt	1,001,450	68.7	
Equatorial Guinea	28,051	0.5	
Eritrea	121,320	4.5	
Ethiopia	1,127,127	70.0	
Gabon	267,667	1.4	
Gambia, The	11,300	1.5	
Ghana	239,460	21.1	
Guinea	245,857	8.1	
Guinea-Bissau	36,120	1.5	
Kenya	582,650	32.5	
Lesotho	30,355	1.8	
Liberia	111,370	3.5	
Libya	1,759,540	5.7	
Madagascar	587,040	17.3	
Malawi	329,750	11.2	
Mali	1,240,000	11.9	
Mauritania	1,030,700	2.9	
Mauritius[4]	2,040	1.2	
Mayotte	374	0.2	
Morocco	446,550	30.6	
Mozambique	801,590	19.1	
Namibia	825,418	2.0	
Niger	1,267,000	12.1	
Nigeria	923,768	140.0	
Reunion	2,517	1	[2]
Rwanda	26,338	8.4	
Sao Tome & Principe	1,001	0.2	
Senegal	196,190	10.5	
Seychelles	455	0.1	
Sierra Leone	71,740	5.4	
Somalia	637,657	9.9	
South Africa	1,219,912	45.6	
Sudan	2,505,810	34.4	
Swaziland	17,363	1.1	
Tanzania[5]	945,087	36.6	
Togo	56,785	5.0	
Tunisia	163,610	10.0	
Uganda	236,040	25.9	
Western Sahara	266,000	0.3	[2]

See footnotes at end of table.

TABLE 1--Continued

AFRICA: AREAL EXTENT AND ESTIMATED POPULATION IN 2004[1]

Country	Area[2] (square kilometers)	Estimated population[3] (millions)
Zambia	752,614	10.5
Zimbabwe	390,580	13.2
Total	30,571,353	868
United States	9,631,418 [6]	294
World	148,940,000	6,345

NA Not applicable.

[1]Includes data available through February 2005. Population estimates are rounded to no more than three significant digits.

[2]Source: U.S. Central Intelligence Agency, World Factbook 2004.

[3]Source: World Bank 2005, World Development Indicators Database.

[4]Includes Agalega Islands, Cargados Carajos Shoals (Saint Brandon), and Rodriguez.

[5]Includes the islands of Mafia, Pemba, and Zanzibar.

[6]Includes only the 50 States and the District of Columbia.

TABLE 2
AFRICA: GROSS DOMESTIC PRODUCT IN 2004[1, 2]

Country	Estimated GDP[3] (billions)	Estimated GDP[3] per capita	Real GDP annual percentage change[4]
Algeria	$217.2	$6,799	5.2%
Angola	36.8	2,457	11.1%
Benin	7.9	1,094	3.1%
Botswana	16.2	10,169	4.9%
Burkina Faso	15.7	1,258	4.6%
Burundi	5.2	708	4.8%
Cameroon	37.8	2,176	3.5%
Cape Verde	2.8	5,858	4.4%
Central African Republic	4.5	1,107	1.3%
Chad	12.8	1,555	29.7%
Comoros	1.0	1,660	1.9%
Congo (Brazzaville)	4.1	1,267	3.6%
Congo (Kinshasa)	37.0	633	6.8%
Cote d'Ivoire	26.6	1,436	1.6%
Djibouti	1.6	1,878	3.0%
Egypt	282.3	4,072	4.1%
Equatorial Guinea	16.7	33,994	32.8%
Eritrea	4.1	909	1.8%
Ethiopia	57.8	814	11.5%
Gabon	9.2	6,922	1.4%
Gambia, The	2.8	1,903	5.1%
Ghana	50.4	2,475	5.8%
Guinea	17.8	1,919	2.7%
Guinea-Bissau	1.1	730	4.3%
Kenya	34.8	1,062	4.3%
Lesotho	4.8	2,074	3.0%
Liberia	3.3 [5, 6]	1,000 [5, 6]	3.0% [5, 6]
Libya	35.0 [5, 6]	6,400 [5, 6]	3.2% [5, 6]
Madagascar	14.9	854	5.3%
Malawi	7.0	569	4.6%
Mali	12.5	1,024	2.2%
Mauritania	6.4	2,187	6.9%
Mauritius	14.9	12,215	4.3%
Mayotte	466.8 [5, 6]	2,600 [5, 7]	NA [5]
Morocco	129.3	4,332	4.2%
Mozambique	23.7	1,247	7.2%
Namibia	13.4	6,449	4.2%
Niger	10.5	865	0.9%
Nigeria	159.8	1,120	6.0%
Reunion	4.3 [5, 6]	5,800 [5, 8]	2.5% [5, 6]
Rwanda	11.6	1,351	4.0%
São Tomé and Príncipe	0.2	1,529	3.8%
Senegal	18.9	1,813	6.2%
Seychelles	1.0	11,847	-2.0%
Sierra Leone	4.5	842	7.4%
Somalia	4.4 [5, 6]	500 [5, 6]	2.1% [5, 6]
South Africa	$501.7	$10,798	3.7%
Sudan	77.4	2,246	6.9%
Swaziland	5.4	4,995	2.1%
Tanzania	24.7	673	6.7%
Togo	8.5	1,564	2.9%
Tunisia	77.4	7,732	5.8%
Uganda	44.7	1,728	5.8%

See footnotes at end of table

TABLE 2--Continued
AFRICA: GROSS DOMESTIC PRODUCT IN 2004[1, 2]

Country	Estimated GDP[3] (billions)	Estimated GDP[3] per capita	Real GDP annual percentage change[4]
Western Sahara	NA [5]	NA [5]	NA [5]
Zambia	9.9	870	5.0%
Zimbabwe	27.1	2,309	-4.2%
Total	2,628.2	3,027.0	NA
United States	11,605.0	39,496.0	4.2%
World	55,655.0	NA	5.1%

NA Not available

[1]Source: International Monetary Fund, World Economic Outlook Database, September 2005.

[2]Table data compiled September 2005; may be different from what is presented in previously written individual country chapters.

[3]Gross domestic product based on purchasing power parity.

[4]Compared with 2003.

[5]Source: U.S. Central Intelligence Agency, World Factbook 2004.

[6]2003 estimate.

[7]1998 estimate.

[8]2001 estimate.

TABLE 3
SELECTED SIGNIFICANT AFRICAN EXPLORATION SITES IN 2004

Country	Type[1]	Site	Commodity[2]	Company	Resource[2, 3]	Exploration[4]
Algeria	P	Tirek-Amesmessa	Au	GMA Resources plc.	1.38 Moz Au	Extensive drilling.
Burkina Faso	E	Essakan	Au	Orezone Resources Inc.	1.9 Moz Au	Do.
Central African Republic	E	Bambari/Passendro	Au	Axmin Inc.	457,000 oz Au	Do.
Congo (Kinshasa)	F	Lufua	Cu, Co	First Quantum Minerals Ltd.	1 Mt Cu, 15,000 t Co	Feasibility drilling.
Do.	E	Moto area	Au	Moto Goldmines Ltd.	607,000 oz Au	Extensive drilling.
Côte d'Ivoire	F	Bonikro	Au	Equigold NL	1 Moz Au	Feasibility drilling.
Eritrea	E	Asmara/Debarwa	Cu, Au	Sunridge Gold Corp.	Data not released	Extensive drilling.
Do.	E	Bisha	Cu, Zn, Au, Ag	Nevsun Resources Ltd.	(5)	Do.
Ghana	P	Bogoso/Prestea	Au	Golden Star Resources Ltd.	2.9 Moz Au	Do.
Do.	E	Bui/Tombe-Parabu	Au	Birim Goldfields, Inc.	Data not released	Do.
Do.	D	Chirano	Au	Red Back Mining NL	1.8 Moz Au	Do.
Guinea	F	Lero area	Au	Guinor Gold Corp.	2.7 Moz Au	Feasibility drilling.
Madagascar	F	Ambatovy	Ni, Co	Dynatec Corp.	2 Mt Ni, 190,000 t Co	Do.
Mali	E	Kofi	Au	Axmin Inc.	106,000 oz Au	Extensive drilling.
Do.	D	Loulo	Au	Randgold Resources Ltd.	4.2 Moz Au	Do.
South Africa	F	Burnstone	Au	Great Basin Gold Ltd.	6.3 Moz Au	Feasibility drilling.
Do.	E	Drenthe/Overysel	PGM, Au, Ni	Anooraq Resources Corp.	4.1 Moz 3PGE+Au	Extensive drilling.
Do.	P	Messina/Dwaalkop	PGM, Au	SouthernEra Resources Ltd.	9.1 Moz 5PGE+Au	Do.
Tanzania	E	Chocolate Reef	Au	Barrick Gold Corp.	Data not released	Do.
Do.	E	Kabanga	Ni	do.	do.	Do.

[1]D--Approved for development; E--Active exploration; F--Feasibility work ongoing/completed; P--Exploration at producing site.

[2]Abbreviations used for commodities in this table include the following: Ag--silver; Au--gold; Co--cobalt; Cu--copper; Ni--nickel; PGM--platinum-group metals; Zn--zinc. Abbreviations used for units of measure include the following: Moz--million troy ounces; Mt--million metric tons; oz--troy ounces; t--metric tons; 3PGE--palladium, platinum, and rhodium; 5PGE--osmium, palladium, platinum, rhodium, and ruthenium.

[3]Based on 2004 data reported from various sources, values vary from measured reserves to identified resources. Data not verified by U.S. Geological Survey.

[4]Sites where extensive (greater than 10,000 meters) drilling or significant (more than $5 million) expenditures have been reported.

[5]Content of principal metal 265,000 t Cu, 760,000 t Zn, 1 Moz Au. Deposit also contains significant silver.

TABLE 4

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2004[1]

(Thousand metric tons unless otherwise specified)

	Metals											
	Aluminum		Chromite, mine output, gross weight	Cobalt, mine output, Co content (metric tons)	Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content	Zinc, mine output, Zn content (metric tons)
Country	Bauxite	Metal[2]					Iron ore, gross weight	Steel, crude			
Algeria	--	--	--	--	--	597 p	1,414 p	1,014 p	--	--	231 p
Angola	--	--	--	--	--	--	--	--	--	--	--
Benin	--	--	--	--	--	20	--	--	--	--	--
Botswana	--	--	--	--	29	162	--	--	--	--	--
Burkina Faso	--	--	--	--	--	1,125	--	--	--	--	--
Burundi	--	--	--	--	--	2,900 e	--	--	--	--	--
Cameroon	--	86 e	--	--	--	1,500 e	--	--	--	--	--
Cape Verde	--	--	--	--	--	--	--	--	--	--	--
Central African Republic	--	--	--	--	--	7 e	--	--	--	--	--
Chad	--	--	--	--	--	150 e	--	--	--	--	--
Comoros	--	--	--	--	--	--	--	--	--	--	--
Congo (Brazzaville)	--	--	--	--	--	60 e	--	--	--	--	--
Congo (Kinshasa)	--	--	--	8,900	73	5,700 e	--	130	--	--	--
Cote d'Ivoire	--	--	--	--	--	1,219	--	--	--	--	--
Djibouti	--	--	--	--	--	--	--	--	--	--	--
Egypt	--	215 e	--	--	--	--	2,500 e	4,400 e	--	8 e	--
Equatorial Guinea	--	--	--	--	--	500 e	--	--	--	--	--
Eritrea	--	--	--	--	--	33	--	--	--	--	--
Ethiopia	--	--	--	--	--	3,443 e	--	--	--	--	--
Gabon	--	--	--	--	--	70 e	--	--	--	1,236	--
Gambia, The	--	--	--	--	--	--	--	--	--	--	--
Ghana	498 e	--	--	--	--	63,139	--	--	--	559 e	--
Guinea	15,000 e	--	--	--	--	10,700	--	--	--	--	--
Guinea-Bissau	--	--	--	--	--	--	--	--	--	--	--
Kenya	--	2 e	--	--	--	1,600	1 e	--	--	--	--
Lesotho	--	--	--	--	--	--	--	--	--	--	--
Liberia	--	--	--	--	--	20	--	--	--	--	--
Libya	--	--	--	--	--	--	--	1,026	--	--	--
Madagascar	--	--	77	--	--	5	--	--	--	--	--
Malawi	--	--	--	--	--	--	--	--	--	--	--
Mali	--	--	--	--	--	37,974	--	--	--	--	--
Mauritania	--	--	--	--	--	--	11,000	5 e	--	--	--
Mauritius	--	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 4--Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2004[1]

(Thousand metric tons unless otherwise specified)

	Metals--Continued										
	Aluminum		Chromite, mine output, gross weight	Cobalt, mine output, Co content (metric tons)	Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content	Zinc, mine output, Zn content (metric tons)
							Iron ore, gross weight	Steel, crude			
Country	Bauxite	Metal[2]									
Morocco and Western Sahara	--	--	--	1,600 e	4 p	1,200 p	10	5 e	31,300 e	4	74,600
Mozambique	7	549	--	--	--	56	--	--	--	--	--
Namibia	--	--	--	--	11	2,205	--	--	14,338	--	66,028
Niger	--	--	--	--	--	684	--	--	--	--	--
Nigeria	--	--	--	--	--	30 e	--	10 e	200 e, 3	--	--
Reunion	--	--	--	--	--	--	--	--	--	--	--
Rwanda	--	--	--	--	--	--	--	--	--	--	--
Sao Tome and Principe	--	--	--	--	--	--	--	--	--	--	--
Senegal	--	--	--	--	--	600 e	--	--	--	--	--
Seychelles	--	--	--	--	--	--	--	--	--	--	--
Sierra Leone	--	--	--	--	--	1,000 e	--	--	--	--	--
Somalia	--	--	--	--	--	--	--	--	--	--	--
South Africa	--	863 p	7,677 p	280 e	103 p	340,500 p	39,322 p	9,504 p	37,485 p	1,905 p	32,310
Sudan	--	--	26	--	--	5,000 e	--	--	--	--	--
Swaziland	--	--	--	--	--	--	--	--	--	--	--
Tanzania	--	--	--	--	4	51,010	--	--	--	--	--
Togo	--	--	--	--	--	--	--	--	--	--	--
Tunisia	--	--	--	--	--	--	244 p	70 p	5,500 e	--	29,011
Uganda	--	--	--	--	--	178	--	7 e	--	--	--
Zambia	--	--	--	13,000 e	427	--	--	--	--	--	--
Zimbabwe	--	--	668 p	-- p	2 p	21,330 p	283 p	180 e	--	--	--
Total	15,500	1,720	8,450	23,800	654	555,000	54,800	16,400	88,800	3,710	202,000
Share of world total	10.5%	4.9%	47.8%	44.7%	4.6%	22.8%	4.1%	1.6%	2.9%	38.2%	2.2%
United States	NA	2,520	--	--	1,160	258,000	54,700	99,700	445,000	--	739,000
Share of world total	NA	7.2%	--	--	8.1%	10.6%	4.0%	9.5%	14.4%	--	8.1%
World total	147,000	35,200	17,700	53,200	14,300	2,430,000	1,350,000	1,040,000	3,090,000	9,720	9,140,000

See footnotes at end of table.

TABLE 4--Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2004[1]

(Thousand metric tons unless otherwise specified)

	Industrial minerals				Mineral fuels			
Country	Cement, hydraulic	Diamond, natural (thousand carats)[4]	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)	Uranium, U_3O_8 content (metric tons)
Algeria	9,000 e	--	--	805 p	--	604,000 p	--	--
Angola	740 e	6,100 5, 6	--	--	--	362,000 p	--	--
Benin	250 e	--	--	--	--	--	--	--
Botswana	--	31,125 7	--	--	916	--	--	--
Burkina Faso	30 e	--	--	2 e	--	--	--	--
Burundi	--	--	--	--	--	--	--	--
Cameroon	930 e	--	--	--	--	34,700 p	--	--
Cape Verde	--	--	--	--	--	--	--	--
Central African Republic	--	350 p	--	--	--	--	--	--
Chad	--	--	--	--	--	61,400	--	--
Comoros	--	--	--	--	--	--	--	--
Congo (Brazzaville)	--	--	--	--	--	82,100	--	--
Congo (Kinshasa)	403	30,880	--	--	1 e	10,100	--	--
Cote d'Ivoire	650 e	230 e	--	--	--	7,430	--	--
Djibouti	--	--	--	--	--	--	--	--
Egypt	28,000	--	--	2,219	100 e	222,000 e	--	--
Equatorial Guinea	--	--	--	--	--	125,000 e	--	--
Eritrea	45 e	--	--	--	--	--	--	--
Ethiopia	1,300 e	--	--	--	--	--	--	--
Gabon	350 e	1 e	--	--	--	87,200	--	--
Gambia, The	--	--	--	--	--	--	--	--
Ghana	1,900 e	905	--	--	--	3,000 e	--	--
Guinea	360 e	740	--	--	--	--	--	--
Guinea-Bissau	--	--	--	--	--	--	--	--
Kenya	1,789	--	--	--	--	--	--	--
Lesotho	--	4 e	--	--	--	--	--	--
Liberia	40 e	10 e	--	--	--	--	--	--
Libya	3,500 e	--	--	--	--	587,000 e	--	--
Madagascar	110 e	--	15,000 e	--	--	--	--	--
Malawi	190 e	--	--	--	41	--	--	--
Mali	--	--	--	--	--	--	--	--
Mauritania	200 e	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 4--Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2004[1]

(Thousand metric tons unless otherwise specified)

	Industrial minerals				Mineral fuels			
Country	Cement, hydraulic	Diamond, natural (thousand carats)[4]	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)	Uranium, U_3O_8 content (metric tons)
Mauritius	--	--	--	--	--	--	--	--
Morocco and Western Sahara	11,000 e	--	--	25,369	(8) e	246	--	--
Mozambique	350 e	--	--	--	17	--	--	--
Namibia	--	2,004	--	--	--	--	3,583	3,583
Niger	40 e	--	--	--	183 e	--	3,870	3,870
Nigeria	2,300 e	--	--	--	9 e	900,000	--	--
Reunion	380 e	--	--	--	--	--	--	--
Rwanda	104	--	--	--	--	--	--	--
Sao Tome and Principe	--	--	--	--	--	--	--	--
Senegal	1,700 e	--	--	1,804 p	--	--	--	--
Seychelles	--	--	--	--	--	--	--	--
Sierra Leone	180	692	--	--	--	--	--	--
Somalia	--	--	--	--	--	--	--	--
South Africa	--	14,293	--	2,735	242,747	6,770	888 p	888 p
Sudan	280 e	--	--	--	--	118,000	--	--
Swaziland	--	--	--	--	550 e	--	--	--
Tanzania	1,281	304	--	7	65	--	--	--
Togo	800 e	--	--	1,115	--	--	--	--
Tunisia	7,124	--	--	7,954	--	25,700 p	--	--
Uganda	520 e	--	--	--	--	--	--	--
Zambia	525 e	--	--	--	240 e	--	--	--
Zimbabwe	400 e	--	10,267	83	2,476	--	--	--
Total	76,800	87,800	25,300	42,100	247,000	3,240,000	8,340	8,340
Share of world total	3.6%	48.5%	2.6%	30.1%	5.4%	12.0%	18.5%	18.5%
United States	99,000	--	--	35,800	933,000	6,500,000	1,040	1,040
Share of world total	4.6%	--	--	25.6%	20.5%	24.0%	2.3%	2.3%
World total	2,150,000	181,000	983,000	140,000	4,550,000	27,100,000	45,100	45,100

[e]Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. [p]Preliminary. NA Not available. -- Zero or zero percent.

[1]Totals may not add owing to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of March 31, 2006.

[2]Primary and secondary production.

[3]Produced as a lead-zinc ore.

[4]Gemstones and industrial diamond.

[5]Does not include smuggled production.

[6]Production was approximately 90% gem and 10% industrial grade.

[7]Assumed to contain about 70% gem and near gem.

[8]Less than 1/2 unit.

TABLE 5

AFRICA: HISTORIC AND PROJECTED BAUXITE PRODUCTION, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Ghana	381	513	504	498	500	500	500
Guinea	15,800	15,800	15,700	15,000	15,000	27,000	27,000
Mozambique	7	11	8	7	8	8	8
Sierra Leone	1,430	--	--	--	--	--	--
Total	17,600	16,300	16,200	15,500	15,500	27,500	27,500

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 6

AFRICA: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Cameroon	93	79	86	86	90	90	90
Egypt	179	180	189	215	200	200	200
Ghana	174	135	137	--	--	--	--
Kenya[2]	--	2	2	2	2	2	2
Mozambique	--	--	54	549	550	680	800
Nigeria	--	--	--	--	--	100	190
South Africa	159	229	673	863	870	1,530	1,530
Total	600	630	1,100	1,700	1,700	2,600	2,800

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Kenya produced secondary refined aluminum; primary production in all other African countries.

TABLE 7

AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1990-2011[1]

(Metal content in thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Botswana	25	25	35	29	35	40	40
Congo (Kinshasa)	509	29	31	73	117	232	160
Eritrea	--	--	--	--	--	--	70
Mauritania	--	--	--	--	30	30	30
Morocco	16	14	7	4	4	4	4
Namibia	28	23	6	11	25	25	25
South Africa	179	166	137	103	107	107	107
Tanzania[2]	--	--	--	4	4	4	4
Zambia	519	316	249	427	700	800	800
Zimbabwe	14	9	2	2	2	2	2
Total	1,300	580	470	650	1,000	1,200	1,200

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Copper contained in concentrates and doré.

TABLE 8

AFRICA: HISTORIC AND PROJECTED REFINED COPPER PRODUCTION, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Botswana	--	--	--	(3)	NA	NA	NA
Congo (Kinshasa)	339	35	--	--	--	--	--
Egypt[2]	4	4	4	14	14	14	14
South Africa	133	124	126	91	115	115	115
Zambia	438	328	227	398	500	800	800
Zimbabwe	14	7	10	7	6	6	6
Total	930	500	370	510	640	940	940

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Egypt produced secondary refined copper; primary production in all other African countries.

[3]Pilot plant production only.

TABLE 9

AFRICA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1990-2011[1]

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	--	--	--	597	1,000	1,500	1,500
Benin	--	300	--	20	20	20	20
Botswana	46	86	4	162	3,000	3,000	3,000
Burkina Faso	7,800	1,319	625	1,125	3,900	3,900	3,900
Burundi	9	2,000	--	2,900	2,900	2,900	2,900
Cameroon[2]	10	800	1,000	1,500	1,500	1,500	1,500
Central African Republic	241	97	15	7	10	10	10
Chad	--	--	120	150	50	50	50
Congo (Brazzaville)	7	10	10	60	10	10	10
Congo (Kinshasa)	9,300	1,180	69	5,700	5,700	9,400	13,200
Cote d'Ivoire	20	1,983	3,444	1,219	1,200	1,200	1,200
Equatorial Guinea	50	50	500	500	500	500	500
Eritrea	--	59	264	33	40	13,200	840
Ethiopia	848	4,500	3,206	3,443	3,500	3,500	3,500
Gabon	80	70	70	70	70	70	70
Ghana	16,800	53,087	72,080	63,139	67,000	67,000	67,000
Guinea	6,340	7,863	15,788	10,700	16,000	16,000	16,000
Kenya	25	170	1,243	1,600	600	600	600
Liberia	600	800	25	20	20	20	20
Madagascar	216	38	5	5	800	1,000	1,000
Mali	5,200	3,996	28,717	37,974	55,000	31,500	31,500
Mauritania	--	1,196	--	--	3,400	5,200	5,200
Morocco	500	580	505	1,200	1,200	1,200	1,200
Mozambique	63	6,800	23	56	65	65	65
Namibia	1,610	2,394	2,417	2,205	2,500	2,500	2,500
Niger	--	1,000	25	684	700	700	700
Nigeria	--	5	52	30	30	30	30
Rwanda	2,160	26	10	--	--	--	--
Senegal	--	--	550	600	600	600	600
Sierra Leone	32	4	--	1,000	1,000	1,000	1,000
South Africa	605,000	523,809	430,800	340,500	303,000	312,000	302,000
Sudan	100	3,700	5,774	5,000	5,000	5,000	5,000
Tanzania	3,500	320	15,060	51,010	58,000	56,000	50,000
Uganda	--	1,506	56	178	1,500	1,500	1,500
Zambia	129	91	600	--	--	--	--
Zimbabwe	16,900	23,959	22,069	21,330	12,000	20,000	20,000
Total	678,000	644,000	605,000	555,000	552,000	563,000	538,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]From artisanal mining.

TABLE 10

AFRICA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1990-2011[1]

(Fe content in thousand metric tons)

Country	Average grade[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	50%	1,470	1,100	820	710	800	800	800
Egypt	55%	1,330	1,120	1,900	2,000	2,000	2,000	2,000
Liberia	57% to 64%	2,490	--	--	--	--	--	--
Mauritania	59% to 72%	6,800	7,000	7,500	7,200	7,200	11,800	11,800
Morocco		90	32	4	5	5	5	5
Nigeria	36%	138	62	9	--	1,000	1,800	1,800
Senegal		--	--	--	--	--	--	3,800
South Africa	62% to 65%	19,800	19,800	21,570	24,800	26,300	33,300	40,700
Tanzania	32%	--	14	--	--	--	--	--
Tunisia	54%	154	122	98	128	100	100	50
Uganda	61% to 67%	--	--	3	--	--	--	--
Zimbabwe[3]		730	160	225	140	200	200	200
Total		33,000	29,400	32,100	35,000	37,600	50,000	61,200

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more that three significant digits.

[2]Direct shipping ore and concentrate.

[3]Average iron content for Zimbabwe prior to 1996 was 61%. Since 1996, the average grade has been 51%.

TABLE 11

AFRICA: HISTORIC AND PROJECTED IRON PRODUCTION, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria[2]	1,046	940	1,100	1,300	1,300	1,300	1,300
Egypt:							
Pig iron	1,100	1,062	1,400	1,700	1,700	1,700	1,700
Direct-reduced iron	710	850	2,110	2,600	2,600	2,600	2,600
Libya[3]	500	963	1,500	1,580	1,600	1,600	1,600
Morocco[2]	15	15	15	15	15	15	15
Mozambique	--	--	--	--	--	200	200
Nigeria							
Pig iron	--	--	--	--	500	1,300	1,300
Direct-reduced iron	110	20	--	--	500	500	500
South Africa:							
Pig iron	6,893	6,055	6,300	6,011	6,460	6,810	6,810
Direct-reduced iron	1,067	1,262	1,526	1,633	1,960	1,960	1,960
Tunisia[2]	140	162	196	--	--	--	--
Zimbabwe[2]	521	209	277	150	200	200	200
Total	12,000	11,500	14,400	15,000	16,800	18,200	18,200

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more that three significant digits.

[2]Pig iron

[3]Direct-reduced iron.

TABLE 12

AFRICA: HISTORIC AND PROJECTED STEEL PRODUCTION, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	836	827	842	1,014	1,700	1,700	1,700
Angola	10	--	--	--	--	--	--
Benin	8	--	--	--	--	--	--
Congo (Kinshasa)	NA	NA	159	130	130	130	130
Egypt	2,240	2,642	2,838	4,400	4,400	4,400	4,400
Kenya	20	20	--	--	--	--	--
Libya	492	909	1,055	1,026	1,300	1,300	1,300
Mauritania	NA	NA	5	5	5	5	5
Morocco	7	7	5	5	5	5	5
Nigeria	220	36	--	10	1,000	2,000	2,000
South Africa	8,620	8,741	8,481	9,504	10,900	11,300	11,300
Tunisia	177	201	237	70	--	--	--
Uganda	--	12	7	7	7	7	7
Zimbabwe	580	210	258	180	200	200	500
Total	13,200	13,600	13,900	16,400	19,600	21,000	21,300

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 13

AFRICA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1990-2011[1]

(Metal content in metric tons)

Country[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	1,100	1,383	818	--	300	300	300
Morocco	68,800	67,708	81,208	31,300	32,000	32,000	32,000
Namibia	18,000	16,084	11,114	14,338	12,000	12,000	10,000
Nigeria	NA	NA	165	200	200	200	200
South Africa	69,400	88,449	75,262	37,485	58,000	58,000	58,000
Tunisia	2,970	6,601	6,602	5,500	1,000	1,000	1,000
Total	160,000	180,000	175,000	89,000	104,000	104,000	102,000

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Nigeria also mined small amounts of lead.

TABLE 14

AFRICA: HISTORIC AND PROJECTED PRIMARY REFINED LEAD PRODUCTION, 1990-2011[1]

(Metric tons)

Country[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	1,000	800	6,100	5,000	5,000	5,000	5,000
Morocco	64,000	59,673	66,812	35,000	35,000	35,000	35,000
Namibia	35,100	26,752	--	--	--	--	--
Total	100,000	87,200	72,900	40,000	40,000	40,000	40,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Nigeria also refines a small quantity of primary lead.

TABLE 15

AFRICA: HISTORIC AND PROJECTED SECONDARY REFINED LEAD PRODUCTION, 1990-2011[1]

(Metric tons)

Country[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	3,500	7,500	--	--	--	--	--
Kenya	2,400	2,000	1,000	1,000	1,000	1,000	1,000
Morocco	2,000	2,600	3,000	4,000	4,000	4,000	4,000
Nigeria	--	4,000	5,000	5,000	5,000	5,000	5,000
South Africa	31,200	32,100	46,200	64,100	64,000	64,000	64,000
Total	39,100	48,200	55,200	74,100	74,000	74,000	74,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Egypt and Uganda also refine small quantities of secondary lead.

TABLE 16

AFRICA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1990-2011[1]

(Metal content in metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Botswana	23,200	18,088	38,420	35,820	38,000	38,000	20,000
Madagascar	--	--	--	--	--	59,000	59,000
Morocco	NA	NA	84	130	130	130	130
South Africa	29,000	30,700	36,616	39,853	41,000	52,000	52,000
Zimbabwe	13,500	11,721	8,160	9,776	10,000	5,000	15,000
Total	65,700	60,500	83,300	85,600	89,100	154,000	146,000

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 17

AFRICA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1990-2011[1]

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
South Africa	87,800	102,300	114,459	159,862	175,000	181,000	181,000
Zimbabwe	21	7	505	4,438	8,900	14,600	14,600
Total	87,800	102,000	115,000	164,000	184,000	196,000	196,000

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 18

AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1990-2011[1]

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
South Africa	38,300	51,000	55,818	78,029	89,000	90,800	90,800
Zimbabwe	31	17	366	3,564	7,700	11,900	11,900
Total	38,300	51,000	56,200	81,600	96,700	103,000	103,000

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 19

AFRICA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1990-2011[1]

(Metal content in metric tons)

Country[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	4,160	7,174	10,452	231	3,500	5,000	5,000
Congo (Kinshasha)	61,800	4,500	--	--	--	--	--
Morocco	18,800	79,947	103,064	74,600	107,000	107,000	107,000
Namibia	37,700	30,209	39,126	66,028	65,000	65,000	65,000
South Africa	75,000	70,241	63,590	32,310	59,000	59,000	59,000
Tunisia	3,960	44,244	41,247	29,011	2,000	1,000	1,000
Total	201,000	236,000	257,000	202,000	237,000	237,000	237,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Nigeria also mined a small quantity of zinc.

TABLE 20

AFRICA: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1990-2011[1]

(Metal content in metric tons)

Country[2]	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	23,600	30,000	34,000	25,000	25,000	25,000	25,000
Congo (Kinshasha)	38,200	--	--	--	--	--	--
Namibia	--	--	--	120,533	150,000	150,000	150,000
South Africa	92,000	98,782	103,000	104,000	104,000	104,000	104,000
Total	154,000	129,000	137,000	250,000	279,000	279,000	279,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Nigeria also refined a small quantity of zinc.

TABLE 21

AFRICA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 1990-2011[1]

(Thousand carats)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Angola[2, 3]	1,130	2,900	4,313	6,100	10,700	10,700	10,700
Botswana	17,400	16,802	24,635	31,125	32,000	32,000	33,000
Cameroon	NA	NA	NA	12 [4]	12	12	12
Central African Republic	381	530	464	350	350	350	350
Congo (Brazaville)	NA	NA	50	50	50	50	50
Congo (Kinshasa)	19,400	22,024	16,006	30,880	30,600	32,100	32,100
Côte d'Ivoire	12	75	320	230	230	230	230
Gabon	1	1	1	1	1	1	1
Ghana	650	632	878	905	900	900	900
Guinea	127	365	327	740	800	800	800
Lesotho	NA	NA	2	4	290	300	300
Liberia	100	150	170	10	10	10	10
Namibia	763	1,382	1,552	2,004	2,100	2,200	2,300
Sierra Leone	78	214	77	692	700	700	700
South Africa	8,710	9,683	10,790	14,293	16,100	16,100	16,100
Tanzania	85	50	354	304	330	330	330
Zimbabwe	--	204	23	44	200	400	400
Total	48,800	55,000	60,000	87,700	95,400	97,200	98,300

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Does not include smuggled production.

[3]Production was about 90% gem and 10% industrial grade.

[4]From artisanal mining.

TABLE 22

AFRICA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1990-2011[1]

(P_2O_5 content in thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	333	500	265	240	310	300	300
Burkina Faso	NA	NA	NA	1	1	1	1
Egypt	286	207	317	650	650	650	650
Mali	2	1	--	--	--	--	--
Morocco	6,910	6,399	7,200	8,500	9,000	9,000	9,000
Senegal	823	556	626	576	720	900	900
South Africa	1,200	1,101	1,083	1,070	1,070	1,070	1,070
Tanzania	8	2	2	2	2	2	2
Togo	840	930	490	418	400	400	400
Tunisia	1,860	2,181	2,500	2,400	2,400	2,500	2,500
Zimbabwe	52	45	25	27	25	25	30
Total	12,300	11,900	12,500	13,900	14,600	14,800	14,900

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 23

AFRICA: HISTORIC AND PROJECTED SALABLE COAL, 1990-2011[1]

(Thousand metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Botswana	793	898	947	916	1,000	1,200	1700
Congo (Kinshasa)	100	10	--	1	1	1	1
Egypt	--	10	39	100	100	100	100
Malawi	41	15	34	41	96	96	96
Morocco	526	650	31	-- [2]	-- [2]	-- [2]	-- [2]
Mozambique	40	40	16	17	26	14,000	14,000
Niger	154	135	158	183	180	180	180
Nigeria	78	29	12	9	10	50	50
South Africa	175,000	206,210	224,118	242,747	258,000	266,000	266,000
Swaziland	151	172	178	550	550	550	550
Tanzania	52	43	79	65	65	1,600	1,600
Zambia	382	141	168	240	250	250	250
Zimbabwe[2]	5,500	5,538	3,809	2,476	2,500	2,500	4,000
Total	183,000	214,000	230,000	247,000	263,000	287,000	289,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Less than 1 unit.

TABLE 24

AFRICA: HISTORIC AND PROJECTED DRY NATURAL GAS PRODUCTION, 1990-2011[1]

(Million cubic meters)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	48,500	58,100	100,092	98,111	120,000	125,000	130,000
Angola	538	560	560	--	--	--	--
Côte d'Ivoire	--	36	1,146	1,500	1,500	1,500	1,500
Egypt	7,900	12,536	21,000	18,000	18,000	16,000	14,000
Equatorial Guinea	--	--	98	1,390	1,400	1,400	1,400
Gabon	150	150	99	80	80	80	80
Ghana	--	--	--	112	100	100	100
Libya	6,200	6,345	5,900	7,000	7,500	7,500	8,000
Morocco	37	22	50	40	40	40	40
Mozambique	--	--	1	1,295	2,500	3,100	3,100
Nigeria	3,230	5,000	21,945	34,411	57,000	60,000	60,000
Senegal	110	110	56	13	13	13	13
South Africa	--	1,980	2,088	2,500	2,500	2,500	2,500
Tanzania	--	--	--	119	380	380	380
Tunisia	200	250	1,600	2,050	2,300	2,200	2,000
Total	66,900	85,100	155,000	167,000	213,000	220,000	223,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 25

AFRICA: HISTORIC AND PROJECTED CRUDE PETROLEUM, INCLUDING CONDENSATE, PRODUCTION, 1990-2011[1]

(Thousand 42-gallon barrels)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Algeria	444,000	438,730	476,288	604,000	600,000	620,000	620,000
Angola	174,000	232,800	273,000	361,715	438,000	438,000	438,000
Benin	1,416	654	--	--	--	--	--
Cameroon	64,600	39,400	32,100	34,675	35,000	35,000	35,000
Chad	--	--	--	61,400	84,000	84,000	80,000
Congo (Brazzaville)	58,800	63,875	100,375	82,069	80,000	80,000	70,000
Congo (Kinshasa)	10,600	10,087	8,500	10,100	10,100	10,100	10,100
Côte d'Ivoire	770	2,000	2,578	7,434	20,000	20,000	20,000
Egypt	319,000	335,800	285,000	219,000	210,000	210,000	200,000
Equatorial Guinea	--	2,300	43,029	125,000	125,000	125,000	125,000
Gabon	100,000	133,000	118,625	87,235	90,000	90,000	90,000
Ghana	--	--	2,555	3,000	3,000	3,000	3,000
Libya	502,000	509,175	538,000	587,000	600,000	600,000	650,000
Morocco	114	36	97	246	300	300	300
Nigeria	660,000	740,000	783,000	900,400	1,200,000	1,200,000	1,200,000
Senegal	8	2	1	--	--	--	--
South Africa	--	--	6,606	6,769	7,300	7,300	7,300
Sudan	--	730	67,152	118,000	280,000	265,000	250,000
Tunisia	36,500	32,690	28,207	25,700	18,000	17,000	16,000
Total	2,370,000	2,540,000	2,770,000	3,230,000	3,800,000	3,800,000	3,810,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 26

AFRICA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1990-2011[1]

(Metal content in metric tons)

Country	1990	1995	2000	2004	2007[e]	2009[e]	2011[e]
Gabon	702	653	--	--	--	--	--
Malawi	--	--	--	--	--	850	850
Namibia	3,214	2,006	2,714	3,038	3,200	3,000	3,000
Niger	2,681	2,970	2,898	3,282	3,300	3,300	3,300
South Africa	2,442	1,443	861	753	1,600	2,100	2,300
Total	9,000	7,100	6,500	7,100	8,100	9,300	9,500

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.